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PHENOLOGICAL OBSERVATIONS IN NOVA SCOTIA AND CANADA, 1902.

Alexander
Howard

BY A. H. MacKAY, Ll. D., F. R. S. C.

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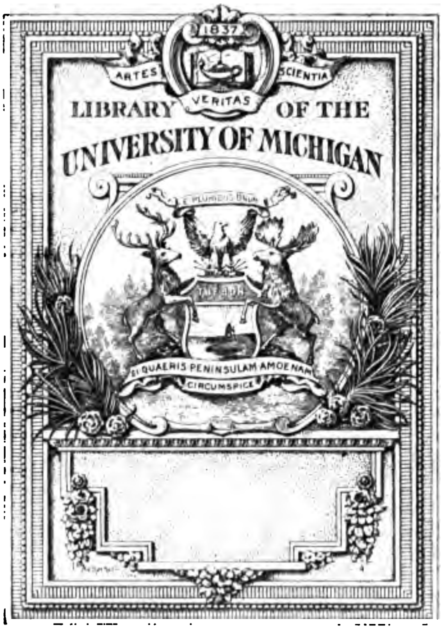
Halifax, N. S.
Author's separates published October, 1904.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PHENOLOGICAL OBSERVATIONS IN NOVA SCOTIA AND CANADA, 1902.—BY A. H. MACKAY, LL. D.

(Received for publication, May, 1903.)

I present in the two tables following a summary of (1) the detailed observations made in Nova Scotia, mainly through the agency of the public schools, and (2) the more general observations made throughout the Dominion of Canada.

The object sought for in the Nova Scotian public school system is the educational one; for the pupils of the schools are the observing naturalists, the teacher being the responsible compiler and recorder of the observations.

The smaller work of the general compilation and publication of the averages of local observations is only the secondary object; but the results are now deemed to be more accurate than those made by individuals only at each station.

References in my previous papers have been made to the observations collected and published by Dr. Ihne of Darmstadt from the continent of Europe; to the school observation system like our own, which is now being, with interesting results, tried in Denmark, under the inspiration of Mr. Carl Michelsen, of Skanderborg, and the practical guidance of M. J. Mathiassen; and to the Natural History Society work of British Columbia.

I have only just received the Report on the Phenological Observations of Great Britain and Ireland for 1902, by Edward Mawley, F. R. Met. Soc., F. R. H. S., which is published in the *Quarterly Journal* of the *Royal Meteorological Society*, vol. XXIX. No. 126, April, 1903. This shows an advance in the treatment of these observations over other publications seen at date; and our system of using " annual " instead of " mensual " dates is exploited in a capital series of phenochronic graphs.

Nova Scotian Phenochrons.

As these are based on about 350 schedules, it will be observed that, as a rule, a good many schedules are averaged for each of the ten meteorological or biological regions of the province. The individual schedules are annually bound up into a volume which can be utilized by weather students in the future with every facility. There are already a number of such volumes in existence. And those of the last years have, to a considerable extent, been analyzed and compiled by a staff of specialists so as to give the phenochrons of the coast, lowland and highland belts of each county. These sheets are likewise being bound up in annual volumes. The Nova Scotian table published here is merely the most generalized average of averages.

A close study of the tables showing individual observations, will create the impression that observers are not always in a position to note the phenomena of the seasons when they first appear. In this respect the observations conducted by the public schools are more accurate. For they are made by a large number of individuals travelling nearly every day to school and radiating from this central point of the community for a distance generally of about two miles. As the teachers stimulate "observing" by noting the first one who brings evidence of the first appearance of a flower, etc., there is a great deal of competitive observation on the part of the young people. This not only makes the travelling to and from school more interesting; but is found to be a great aid to general "nature study." Accuracy is assured by the bringing of the specimen to the school room when practicable.

But even in schools mistakes may occur through accident in recording, and sometimes from lack of sufficient knowledge of the natural history of the locality. In order to discover such mistakes, and to enable directions to be framed in order to minimize them as well as for the purpose of studying and compiling regional phenochrons, the observation schedules filled in by the teacher of each school is sent to one of a staff of special-

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ists. Their criticisms are annually published in the *Journal of Education of Nova Scotia*, which also contains the names of observers and number of observations made in each of the schools reporting. Under the advice of this phenological staff several changes were made in the schedules issued after 1902, which are known as the " 1903 schedule."

The names and addresses of the Nova Scotian phenological staff at present are as follows :

C. B. Robinson, B. A., Science Master, Pictou Academy.
E. J. Lay, Principal, Amherst Academy.
J. E. Barteaux, Science Master, Truro Academy.
Antoinette Forbes, B. A., Windsor Academy.
Burgess McKittrick, B. A., Principal, Lunenburg Academy.
Minnie C. Hewitt, Lunenburg Academy.
G. R. Marshall, Principal, Richmond School, Halifax.
Stanley C. Bruce, Principal, Shelburne Academy.
A. W. Horner, Principal, Public School, Yarmouth.

Canadian Phenochrons.

The second table contains the observations of the following members of the Botanical Club of Canada on the dates of the first appearances of the phenomena briefly indicated only in the table, although precisely specified in the schedules for recording them ; and are published here in order to keep the series published in the Transactions of our Institute continuous. The addresses and stations of the observers are as follows, in the order of the table :

T. A. Good, Woodstock, New Brunswick ; J. M. Duncan, Charlottetown, Prince Edward Island ; John McSwain, Charlottetown, Prince Edward Island ; Dr. Cephas Guillet, Ottawa, Ontario ; Mrs. Frank E. Webster, Beatrice, Muskoka, Ontario ; Dr. J. H. Elliott, Gravenhurst, Muskoka, Ontario ; T. R. Donnelly, Pheasant Forks, Assiniboia ; Percy B. Gregson, Blackfalds, Alberta ; J. K. Henry, B. A., Vancouver, British Columbia.

The first column is the average of about 350 schedules of observations made by as many of the public schools of the province of Nova Scotia, and the active members of the club among whom the following have been sending in reports : Rev. James Rosborough, Musquodoboit Harbor, Halifax Co.; Miss Louise MacMillan, Sydney Mines, Cape Breton ; Mrs. G. Ormond Forsyth, Port Hawkesbury, Inverness Co.; and Miss Janet Keith Bruce Kelley, Yarmouth.

The last column is the average of scattered observations from about ten observers in different parts of the south of British Columbia, five being from Vancouver Island or the coast, two from the dry belt, and three from the mountain belt. These observations were made on the schedule prepared and published by the Natural History Society of the province, and were communicated to me by A. J. Pineo, Esq., B. A., of Victoria, and are published in detail in my report from the Botanical Club of Canada to the Royal Society of Canada.

NOVA SCOTIAN PHENOCHRONS, 1902.

FLOWERING AND OTHER PHENOCHRONS FOR EACH REGION OF THE PROVINCE OF NOVA SCOTIA, COMPILED FROM 350 PUBLIC SCHOOL OBSERVATION SCHEDULES.

[*The phenochrons for each region (which are averages of many observations) have the fractions omitted.*]

Day of the year corresponding to the last day of each month.

Jan	31	July	212
Feb	59	Aug	243
March	90	Sept	273
April	120	Oct	304
May	151	Nov	334
June	181	Dec	365

When First Seen.													When Becoming Common.										
Regions.														Regions.									
1. Yarmouth and Digby.	2. Shelburne, Queens and Lunenburg.	3. Annapolis and Kings.	4. Hants and South Colchester.	5. Halifax and Guysboro.	6. South Cobequid Slope (S. Cumb. and Col.)	7. North Cumb., Col., Pictou and Antig.	8. Richmond and Cape Breton.	9. Bras d'Or Slope (Inv. and Victoria)	10. Inverness Slope to Gulf.	Average for Province.	Number.		Average for Province.	1. Yarmouth and Digby.	2. Shelburne, Queens and Lunenburg.	3. Annapolis and Kings.	4. Hants and South Colchester.	5. Halifax and Guysboro.	6. South Cobequid Slope (S. Cumb. and Col.)	7. North Cumb., Col., Pictou and Antig.	8. Richmond and Cape Breton.	9. Bras d'Or Slope (Inv. and Victoria).	10. Inverness Slope to Gulf.
94	83	98	88	101	90	88	99	93	96	93.5	1	Alnus incana, Willd.	101 0	107	96	103	98	....	103	95	104	99	102
108	105	108	94		98	102	99	105	111	103.5	2	Populus tremuloides, Michx.	112.3	120	118	114	101	....	110	106	112	111	118
186	88	90	92	90	101	101	98	98	103	94.9	3	Epigæa repens, L.	107.4	103	101	103	108	107	110	109	109	112	113
113	117	115	117	121	118	120	125	121	124	119.1	4	Viola cucullata, Gray	127.0	118	126	125	126	130	128	127	131	129	129
110	114	115	115	115	115	117	123	121	123	116.9	5	V. blanda, Willd.	124.9	119	122	123	124	124	125	125	130	128	129
118	115	116	111	116	115	117	124	123	117	117.1	6	Acer rubrum, L.	123 8	125	122	121	119	124	124	123	129	128	123
136	127	130	132	125	127		....	....	146	131.8	7	Houstonia cærulea, L.	139.3	....	134	135	144	138	133	....	...	....	151
120	125	114	119	....	118	121	123	140	120	122.4	8	Equisetum arvense, L.	130 2	133	132	125	126	...	129	127	134	134	128
111	119	117	118	118	121	120	128	122	123	119.8	9	Taraxacum officinale, Weber	129.0	121	127	127	127	133	131	129	133	129	131
127	152	135	128	....	126	121	....	...	126	130.8	10	Erythronium Americanum, Ker.	138 4	127	156	158	134	....	130	128	....	....	135
123	117	99	130		....	....	....	....		117.4	11	Hepatica triloba, Chaix	123.4	129	125	102	137	....	....	....	....	....	....
120	125	129	127	126	126	132	133	130	134	128 3	12	Coptis trifolia, Salisb	135.3	129	131	133	134	136	134	139	139	138	140
116	119	114	116	117	116	119	122	119	118	117.6	13	Fragaria Virginiana, Mill	129.2	123	129	124	127	132	129	130	129	140	129
*157	163	157	164	167	165	167	178	175	172	†166 6	11	" " (fruit ripe)	178.4	174	176	173	177	179	174	180	186	184	182

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*Last year the date here should have been 154 instead of "114" which was a clerical error.

†The "154" of last year should have been 158.

134	139	136	138	141	140	140	148	145	150	141.2	15	Prunus Pennsylvanica, L.	147.6	141	146	144	144	150	145	146	153	151	156
217	210	....	....	....	....	233	....	225	230	223.1	16	" (fruit ripe)	228.8	231	212	...	....	....	...	237	...	234	230
129	131	137	137	137	141	143	152	151	150	141.0	17	Vaccinium Penn. v. Can., Lam.	150.4	139	141	144	146	152	153	151	161	157	157
192	186	193	238	....	195	218	212	221	208	207.1	18	" (fruit ripe)	220.8	211	189	211	254	....	....	229	220	237	213
139	144	139	144	152	142	147	160	153	131	147.2	19	Ranunculus acris, L.	155.9	150	151	150	153	161	154	156	168	159	157
145	143	153	153	157	158	157	161	162	164	155.3	20	R. repens, L.	162.2	152	154	161	159	167	163	164	171	163	168
145	151	146	158	....	156	154	165	166	...	155.2	21	Clintonia borealis, Raf.	161.1	154	156	149	159	....	165	159	172	173	...
142	145	135	148	158	142	146	169	155	141	148.0	22	Trillium erythrocarpum, Mich.	153.2	152	152	141	155	153	149	154	170	160	145
139	144	135	148	150	148	148	163	151	147	147.4	23	Trientalis Americanum, Pursh.	154.7	149	153	146	153	154	157	152	170	158	155
151	152	151	157	159	164	160	168	161	....	158.4	24	Cypripedium acaule, Ait.	163.3	158	158	157	166	165	166	162	173	164	....
151	158		170		144	158	165	177	..	160.6	25	Calla palustris, L.	190.0	162	163	....	179	....	....	164	168	183	....
137	135	133	134	139	139	153	151	143	141	138.8	26	Amelanchier Canadensis, T.	145.3	144	141	139	141	146	144	142	159	150	147
191	191	....	...	....	....	204	....	189	....	194.0	27	" (fruit ripe)	210.6	212	207	...	....		.. .	213	....	210	....
156	163	154	154	....	159	163	152	164	162	158.6	28	Rubus strigosus, Michx.	156.9	166	170	161	168	..	167	172	160	168	167
205	201	206	181	....	200	207	215	212	207	203.8	29	" (fruit ripe)	218.0	227	218	213	....	...	212	213	220	222	217
165	165	164	160	169	165	176	....	160	170	166.1	30	Rubus villosus, Ait.	173.9	175	173	173	171	...	172	180	...	169	177
231	216	225	238	....	225	234	...	253	239	232.7	31	" (fruit ripe)	241.4	246	229	236	246	...	228	239	....	263	244
144	145	147	146	....	151	158	167	161	142	151.4	32	Kalmia glauca, Ait.	157.5	152	151	155	153	.	153	163	170	166	155
142	165	150	178	157	176	178	162	162	167	163.7	33	K. angustifolia, L.	170.1	151	171	157	182	163	182	185	168	168	173
144	149	144	149	156	151	150	161	156	163	152.4	34	Cornus Canadensis, L.	160.6	154	160	152	158	166	159	158	167	166	167
245	203	....	241	...	....	203	....	211	213	216.1	35	" (fruit ripe)	225.1	249	207	...	229	..	....	228	....	219	218
152	154	151	154	158	157	157	175	163	163	158.5	36	Sisyrinchium angustifolium	166.4	161	161	158	162	166	166	166	181	170	171
160	159	159	164	168	171	172	175	179	178	168.6	37	Linnæa borealis, L.	174.5	167	166	164	169	176	178	178	181	185	182
158	172	178	....	....	....	176	182	161	....	171.5	38	Linaria Canadensis, Dum.	176.4	170	171	182	....	...	....	179	186	170	..
166	168	165	170	....	171	175	...	170	178	170.5	39	Rhinanthus Crista-galli, L.	177.8	173	174	175	176	....	176	180	.	187	180
160	163	165	154	....	. .	166	173	174	. ..	165.2	40	Sarracenia purpurea, L.	173.8	182	169	172	159	....	173	...	182	179	....
171	171	174	173	..	164	174	183	172	161	171.5	41	Brunella vulgaris, L.	180.0	190	177	176	179	....	180	182	188	168	....
....	186	....	191	....	....	....	....	180	190	186.9	42	Epilobium angustifolium, L.	198.0	206	187	....	200	....	.. .	...	...	197	199
182	178	175	182	....	183	179	...	187	185	181.5	43	Rosa lucida, Ehrh.	192.6	202	184	180	186	...	204	187	....	201	196
....	168	185	150	....	...	176	....	....		170.0	44	Hypericum perforatum, L.	173.5	....	163	190	155	....	186	...	....	...	....
162	165	167	168	172	171	170	176	173	...	169.6	45	Leontodon autumnale, L.	177.4	. ..	173	173	177	182	177	176	173	186	....
136	139	136	141	146	146	144	150	144	148	143.3	46	Prunus Cerasus (cultiv.)	149.6	142	146	143	148	156	151	149	155	151	154
196	201	190	....	.	194	204	200	....	200	197.2	47	" (fruit ripe)	210.4	213	112	199	. ..	...	220	206	210		212
162	156	157	157	....	158	157	168	155	157	158.5	48	Cratægus Oxyacantha, L.	164.9	169	164	162	164	...	165	165	174	161	161
155	153	155	145	....	...	157	....	164	...	155.2	49	C. coccinea, L.	162.7	168	160	161	152	...	....	164	..	170	..
137	141	138	142	149	144	144	154	153	150	145.4	50	Prunus domestica (cultivated)	151.5	143	148	146	148	154	149	150	162	160	156
141	143	142	145	152	147	147	157	150	153	147.6	51	Pyrus malus (cultivated) early	154.1	150	150	148	151	158	153	152	164	157	159
150	150	148	155	159	155	157	163	160	160	155.8	52	" " late	161.8	160	156	156	160	...	160	162	171	166	164
133	138	137	140	143	138	140	156	147	147	141.9	53	Ribes rubrum (cultivated)	147.9	138	144	142	146	150	146	148	163	154	149
192	199	178	197	....	....	194	....	201	195	193.7	54	" (fruit ripe)	205.6	212	207	182	228	...	. ..	200	. .	205	205
143	141	131	140	145	138	141	157	152	141	142.9	55	R. nigrum (cultivated)	149.4	147	146	145	147	151	146	147	162	157	146
210	200	....	221	....	....	205	....	201	203	207.1	56	" (fruit ripe)	214.2	219	205	....	227	....	....	210	. .	209	214
157	157	153	159	165	159	160	172	165	162	160.8	57	Syringa vul., L. (cultivated)	167.9	165	163	161	165	172	164	166	178	174	171
177	182	179	185	...	185	187	205	187	..	185.9	58	Solanum tuberosum, L.	198.5	187	188	. .	198	....	...	211	212	200	193
176	162	171	175	168	187	177	180	190	192	177.9	59	Phleum pratense, L.	179.3	163	168	178	183	175	156	188	190	195	197
155	159	158	158	164	160	162	172	165	172	162.6	60	Trifolium repens, L.	170.3	164	167	165	168	171	167	171	176	175	178
149	145	154	158	154	159	162	172	164	169	159.5	61	T. pratense, L.	168.7	159	163	164	166	168	170	170	179	173	176
...	....	....	....	....	....	203	....	207	....	205.0	62	Triticum vulgare, L.	210.8	....	....	....	....	....	....	208	...	213	....

NOVA SCOTIA PHENOCHRONS, 1902—(*Continued*).

When First Seen.												Day of the year corresponding to the last day of each month. Jan ..... 31 July........212 Feb .... 59 Aug..........234 March ... 90 Sept..........273 April .....120 Oct...........304 May ......151 Nov...........334 June......181 Dec...........365	When Becoming Common.										
Regions.														Regions.									
1. Yarmouth and Digby.	2. Shelburne, Queens and Lunenburg.	3. Annapolis and Kings.	4. Hants and South Colchester.	5. Halifax and Guysboro.	6. South Cobequid Slope (S. Cumb. and Col.)	7. North Cumb., Col., Pictou and Antig.	8. Richmond and Cape Breton.	9. Bras d'Or Slope (Inv. and Victoria).	10. Inverness Slope to Gulf.	Average for Province.	Number.		Average for Province.	1. Yarmouth and Digby.	2. Shelburne, Queens, and Lunenburg.	3. Annapolis and Kings	4. Hants and South Colchester.	5. Halifax and Guysboro	6. South Cobequid Slope (S. Cumb. and Col).	7. North Cumb., Col., Pictou and Antig.	8. Richmond and Cape Breton.	9. Bras d'Or Slope (Inv. and Victoria).	10. Inverness Slope to Gulf.
202	199		....	....	....	....	....	203	....	210.7	63	Avena sativa, L.	212.3	226	203	....	....	....	...	....	....	207	....
210	196	191	180	....	198	....	....	....	194	194.9	64	Fagopyrum esculentum, L.	204.6	207	199	206	....	...	206	....	....	....	...
131	136	135	137	....	146	142	..	135	....	137.5	65a	Earliest full leafing of tree	....	....	....	....	....	....	....	....	....	....	....
158	163	161	163	....	174	162	....	166	175	165.2	65b	Latest " "	....	...	....	..	..	....	....	..	....	....	....
90	104	101	107	120	105	112	101	105	100	104.6	66	Ploughing (first of season)	117.9	108	116	116	119	141	117	121	111	121	109
105	113	116	128	115	115	118	115	125	120	117.2	67	Sewing " "	126.3	119	126	129	125	125	121	128	128	132	128
103	111	119	123	111	122	119	109	118	115	115.1	68	Potato-planting "	128.9	130	123	136	136	124	137	130	121	129	123
130	124	125	140	124	125	131	130	116	109	125.5	69	Sheep-shearing "	138.9	145	135	141	149	143	136	150	142	128	122
183	183	185	190	....	190	191	213	201	200	192.9	70	Hay-cutting "	201.4	192	192	190	207	....	198	200	218	207	208
236	232	216	229	....	227	226	254	235	224	231.0	71	Grain-cutting "	239 3	242	238	229	239	236	237	238	259	242	232
255	254	251	254	251	256	264	280	266	250	258.3	72	Potato-digging "	269 3	264	269	266	266	265	268	272	279	272	272
68	65	69	90	....	72	79	60	84	68	72.7	73a	Opening of rivers "	....	...	....	....	....	....	....	....	....	....	....
69	78	76	96	....	80	79	79	82	72	78 9	73b	Opening of lakes "	....	....	....	...	....	....	....	....	....	....	..
97	96	98	96	97	96	102	107	119	123	103.0	74a	Last snow to whiten ground	....	....	....	....	....	....	....	....	....	....	....
111	116	124	123	115	121	129	128	132	132	123.2	74b	" to fly in air	....	....	....	....	....	....	....	....	....	....	....
145	139	142	139	....	146	141	138	137	137	140.5	75a	Last spring frost—hard	....	....	....	....	....	....	....	....	....	....	....
161	139	154	164	. ..	158	156	157	155	150	154.9	75b	" " hoar	....	....	....	....	....	....	....	....	....	....	....
92	79	80	110	....	87	84	84	84	72	85.9	76a	Water in streams—highest	....	....	....	....	....	....	....	....	....	....	....
254	253	207	245	...	266	251	250	236	242	245.0	76b	" " lowest	....	....	....	....	....	....	....	....	....	....	....
262	262	270	254	262	256	266	279	264	271	264.7	77a	First autumn frost—hoar	....	....	....	....	....	....	....	....	....	....	....
293	283	301	290	284	285	285	302	285	295	290.3	77b	" " hard	....	....	....	....	....	....	....	....	....	....	....
297	291	292	288	297	290	292	306	284	296	293.4	78a	First snow to fly in air	....	..	....	....	....	....	....	....	....	....	....
310	315	315	322	317	303	308	317	313	311	313.1	78b	" whiten ground	....	....	....	....	....	....	....	....	....	....	....

323	344	342	341	....	....	352	357	350	362	346.5	79a	Closing of Lakes
334	369	345	.	....	324	375	387	....	346	354.3	79b	" Rivers
67	82	77	76	68	69	75	84	80	83	76.3	81a	Wild ducks migrating, N
268	299	300	311	....	278	286	270	314	329	295.1	81b	" " " S
81	81	76	77	64	71	68	80	85	77	76 1	82a	" geese " N
314	333	320	302	316	293	311	....	313	291	310.3	82b	" " " S
81	86	93	89	87	76	82	78	95	87	85.4	83	Melospiza fasciata, North
74	77	71	78	78	75	76	76	87	90	78.3	84	Turdus migratorius "
70	88	68	80	76	76	...	84	....	90	79.1	85	Junco hiemalis "
99	127	112	118	134	124	138	116	124	147	124.0	86	Actitis macularia "
122	109	122	97	...	74	..	112	113	108	107.0	87	Sturnella magna "
118	127	131	123	115	115	122	118	103	140	121.3	88	Ceryle Alcyon "
112	138	135	147	144	141	...	....	142	138	137.2	89	Dendrœca coronata "
133	138	137	151	143	136	147	138	138	141	140.2	90	D. æstiva "
111	96	101	106	104	108	80	110	105	11	103.5	91	Zonotrichia alba "
143	143	140	142	142	141	145	153	155	156	146 1	92	Trochilus colubris "
..	164	136	134	....	125	139	....	146	128	138.7	93	Tyrannus Carolinensis "
....	146	131	136		135	145	123	120	126	132 9	94	Dolychonyx oryzivorus "
....	148	136	132	138	136	....	119	121	132	132.8	95	Spinis tristis "
....	106	155	123	....	151	....	94	136	...	127.7	96	Setophaga ruticilla "
....	152	....	156	....	120	....	130	....	131	138.0	97	Ampelis cedrorum "
133	128	128	129	127	129	...	102	125	138	126.7	99	Chordeiles Viginianus "
83	82	86	89	92	92	91	96	102	98	91.1	98	First piping of frogs
86	90	100	102	101	108	102	111	108	108	101.7	100	First appearance, snakes

THUNDERSTORMS—PROVINCE OF NOVA SCOTIA—REGIONS 1 TO 10.

OBSERVATION STATIONS—YEAR 1901.

1. Yarmouth and Digby.	2. Shelburne, Queens and Lunenburg.	3. Annapolis and Kings.	4. Hants and South Colchester.	5. Halifax and Guysboro.	6 S. Cobequid Slope (S. Cum. & Col.)	7. North Cum., Col., Pictou & Antig.	8. Richmond and Cape Breton.	9. Bras d'Or Slope (Inv. & Victoria).	10. Inverness Slope to Gulf.
237^{5} 245^{1} 246^{4} 247^{1} 250^{2} 256^{1} 259^{2} 260^{1} 273^{1} 288^{1} 314^{1}	237^{6} 246^{1} 250^{1} 255^{1} 257^{1} 258^{3} 265^{1} 268^{1} 279^{1}	237^{2} 244^{1} 247^{1} 250^{2} 251^{2} 256^{1} 258^{4} 259^{2} 304^{1}	237^{2} 238^{2} 250^{1} 251^{3} 256^{1} 273^{1} 287^{1}	237^{1} 251^{2} 255^{1} 259^{2} 261^{1} 288^{1}	250^{2} 251^{10}	238^{1} 250^{3} 251^{22} 252^{1} 256^{9} 258^{1} 259^{1} 265^{1} 290^{2}	250^{1} 251^{2} 252^{1} 256^{3} 319^{3}	251^{2} 252^{1} 256^{2} 258^{1} 290^{1}	251^{1} 253^{2} 256^{2} 257^{1} 304^{1}

OBSERVATION STATIONS—YEAR 1901.

1 Yarmouth and Digby.	2. Shelburne, Queens and Lunenburg.	3. Annapolis and Kings.	4. Hants and South Colchester.	5. Halifax and Guysboro.	6. S. Cobequid Slope (S. Cum. & Col.)	7. North Cum., Col., Pictou & Antig.	8. Richmond and Cape Breton.	9 Bras d'Or Slope (Inv. & Victoria).	10. Inverness Slope to Gulf.
198^{1} 203^{1} 205^{1} 212^{1} 220^{1}	189^{1} 190^{2} 191^{1} 196^{2} 197^{1} 198^{1} 199^{1} 201^{1} 222^{1} 204^{1} 212^{1} 220^{1} 231^{1} 235^{2}	183^{1} 189^{2} 196^{2} 197^{1} 212^{1} 220^{1} 222^{1} 223^{1}	182^{1} 183^{1} 212^{1} 218^{1} 229^{1}	182^{1}	182^{2} 192^{2} 196^{2} 197^{4} 220^{2}	182^{17} 183^{6} 189^{9} 197^{2} 198^{2} 208^{1} 209^{1} 212^{8} 215^{1} 219^{1} 228^{2} 230^{1}	183^{1} 227^{1}	190^{1} 196^{1} 199^{2} 203^{2} 205^{1} 212^{1} 213^{1} 221^{2} 222^{1} 228^{1}	182^{1} 196^{1} 203^{1} 212^{1} 213^{1} 221^{2} 223^{1} 228^{2}

The index figure above indicates the number of stations from which thunder was reported.

THUNDERSTORMS—PROVINCE OF NOVA SCOTIA—REGIONS 1 TO 10.

OBSERVATION STATIONS—YEAR 1902.									
1. Yarmouth and Digby.	2. Shelburne, Queens and Lunenburg.	3. Annapolis and Kings.	4. Hants and South Colchester.	5. Halifax and Guysboro.	6. S. Cobequid Slope (S. Cum. & Col.)	7. North Cum., Col., Picton & Antig.	8. Richmond and Cape Breton.	9. Bras d'Or Slope (Inv. & Victoria).	10. Inverness Slope to Gulf.
129	129^{8}	....	....	....	....	....	....	....	....
....	130	....	130	....	....	....	....	....	....
....	....	....	133	....	....	141^{1}	141	133	....
....	....	....	142^{2}	....	142^{2}	142^{2}	....	139	....
143^{2}	143^{3}	143^{25}	143^{9}	....	143^{9}	143^{27}	143^{2}	143	143^{2}
144^{8}	144^{28}	144^{5}	144^{14}	144^{16}	144^{3}	144^{11}	144^{5}	144^{6}	144^{3}
145	145^{7}	....		....	....	145	145	145^{3}	145^{2}
....	116	....	146^{2}	....	....	147	146	....	....
....	....	....	....	....	148	148^{2}	148	....	....
....	....		....	....	152	151^{2}	....	....	....
....	....	153	153^{5}	153	153^{13}	....	....	153	....
154^{4}	154^{9}	154	154	....	154^{2}	....	154^{3}	....	....
155^{6}	155^{37}	....	155^{4}	155^{15}	155	....	155^{3}	....	155^{2}
157^{3}	156	....	....	....	....	....	....	....	156
160	158	161^{2}	158	....	....	....	....	....	157
161^{3}	159	162	....	....	162	....	162	....	....
164	162^{1}	161	....	....	....	....	....	....	....
166	166^{3}	....	....	....	....	....	....	....	....
167^{6}	167^{15}	167^{2}	....	167^{4}	....	....	....	....	....
168^{5}	168^{6}	168^{3}	168^{5}	168^{9}	168	168^{6}	....	....	....
....	170	....	....	....	169	169^{2}	....	169	....
....	171^{26}	171^{9}	....	170	....	171	....	171	....
....	173	172	....	....	....	173	....	....	....
....	174	173	....	....	....	174^{3}	....	174	174
175	175	....	175^{7}	175^{4}	....	175^{29}	....	175^{6}	175^{2}
....	176^{28}	176^{2}	176^{16}	176^{8}	....	176^{7}	176	176^{3}	176^{5}
177^{2}	....	177^{5}	177	....	....	178^{4}	....	177^{2}	177
....	....	....	179	....	197	181	....	178	....

OBSERVATION STATIONS—YEAR 1902.									
1. Yarmouth and Digby.	2. Shelburne, Queens and Lunenburg.	3. Annapolis and Kings.	4. Hants and South Colchester.	5. Halifax and Guysboro.	6. S. Cobequid Slope (S. Cum. & Col.)	7. North Cum., Col., Picton & Antig.	8. Richmond and Cape Breton.	9. Bras d'Or Slope (Inv. & Victoria).	10. Inverness Slope to Gulf.
33^{3}	49	....	34	....	....	42	....	....	....
....	68	....	....	....	....	....	....	....	....
....	77	....	....	....	....	71	....	....	....
....	78	81^{2}	80	....	....	87	....	89	89
....	85	90	....	90	88	88	90	90^{3}	90^{2}
....	92	....	92	....	92^{5}	....	91^{4}	91^{3}	91^{3}
....	94	....	....	....	93	....	....	....	....
....	96	....	96	....	....	....	....	96	....
....	99^{19}	99	....	....	....	....	....	....	....
....	100^{2}	101	....	....	....	101	....	....	....
....	103^{38}	103^{11}	....	103	103	....	....	....	....
....	104	....	....	....	104	....	....	....	....
....	105	....	....	....	....	....	....	....	....
....	106	....	....	....	....	....	....	....	....
....	107	....	....	....	....	107	....	....	....
....	....	....	109	....	....	109^{3}	....	....	....
....	110	....	....	....	110	110^{2}	....	....	....
111	....	111^{2}	....	....	111^{5}	111^{30}	....	....	....
112	112^{45}	112^{13}	....	....	....	112^{2}	....	....	....
....	....	113	....	....	....	113	113	113^{2}	....
114	....	....	....	....	....	114^{6}	114	114^{3}	....
....	....	....	115	....	....	115^{3}	....	....	115^{2}
116^{17}	116^{34}	116^{21}	116^{18}	116^{7}	116^{19}	116^{60}	116	116^{2}	116^{4}
117	117	117^{2}	117^{3}	....	117^{6}	117^{3}	....	117^{3}	117
....	....	....	....	118	....	118	....	....	118
126	121	123	....	....	....	120	....	....	....
127^{7}	127^{71}	125	....	....	....	127	....	....	....
....	....	128^{2}	128	....	....	128	....	....	....

The index figure above indicates the number of stations from which thunder was reported.

CANADIAN PHENOCHRONS, 1902.

OBSERVATION STATIONS—WHEN FIRST SEEN.

Number.	Day of the year 1902 corresponding to the last day of each month. Jan .... 31 July ......212 Feb .... 59 Aug ....243 March ..... 90 Sept ....273 April ......120 Oct ....304 May ....151 Nov ....334 June ......181 Dec 365	Average dates for Nova Scotia.	Woodstock, N. B.	Charlottetown, P. E. I. (1)	Charlottetown, P. E. I. (2).	Ottawa, Ont.	Beatrice, Muskoka, Ont.	Muskoka, Ont.	Pheasant Forks, Assa.	Blackfalds, Alberta	Vancouver, B. C.	Average dates for British Columbia
1	Alnus incana, Willd...........	93.5	*95	116	123	97	87	....	....	....	*d*59	*d*108.7
2	Populus tremuloides, Mx......	103.5	*102	....	127	96	*99	....	137	135	....	......
3	Epigæa repens, L..............	94.9	....	76	107	*106	....	99	....	...	...	.... .
4	Viola cucullata, Gray........	119.1	*102	117	...	132	*110	114	137	123	*e*97	... ..
5	V. blanda, Willd	116.9	*102	117	....	120	*112	103	140	....	100	......
6	Acer rubrum, L................	117.1	*115	121	123	96	*110	107	....	....	*f*92	. ....
7	Houstonia cærulea, L..........	131.8	...	....	....	....	....	....	....	....	....	......
8	Equisetum arvense, L.........	122.4	....	....	....	104	*142	....	....	...	80	......
9	Taraxacum officinale, Web....	119.8	122	120	130	109	*126	112	138	195	....	......
10	Erythronium Amer., Ker.....	130.8	*122	....	....	108	*142	112	....	....	....	.....
11	Hepatica triloba, Chaix........	117.4	...	....	...	86	....	87	....	....	....	......
12	Coptis trifolia, Salisb..........	128.3	*143	....	....	120	*142	123	....	....	....	......
13	Fragaria Virginiana, Mill.....	117.6	125	147	138	111	*161	120	127	156	. ..	102.8
14	" (fruit ripe)....	166.6	....	....	....	161	....	....	183	200	..	153.
15	Prunus Pennsyl., L.	141.2	143	....	....	127	*138	133	147	143	*g*116	.....
16	" (fruit ripe)....	223.1	....	232		....	....	....	....	223	....	.... .
17	Vaccinium Penn., Lam........	141.0	145	....	....	119	....	123	....	....	. ..	128
18	" (fruit ripe)....	207.1	....	....	....	....	*216	....	....	219	....	185.1
19	Ranunculus acris, L..........	147.2	149	166	....	140	*156	153	120	170	*130	119.6
20	R. repens, L.....	155.3	151	127	....	154	....	...	....	....	125	......
21	Clintonia borealis, Raf........	155.2	...	....	....	....	....	145	...	...	....	......
22	Trillium erythrocarpum.	148.0	*143	....	....	125	*130	138	...	....	....	......
23	Trientalis Ameri., Pursh......	147.4	-	145	....	137	....	141	....	....	*h*124	......
24	Cypripedium acaule, Ait.....	158.4	....	....	....	137	*163	142	.. .	*b*170	...	*k*121.8
25	Calla palustris, L	160.6	...	....	....	164	*156	....	....	....	....	......
26	Amelanchier Canadensis......	138.8	....	147	....	120	*126	124	144	*c*143	...	*c*123.5
27	" (fruit ripe)....	194.0	....	....	....	....	....	....	....	205	...	......

*When becoming common. *a* Rosa blanda. *b* Cypripedium hirsutum. *c* A. alnifolii. *d* Alnus rubra. *e* Viola palustris. *f* A. macrophyllum. *g* Prunus emarginata. *h* Trientalis Europæa. *k* Calypso.